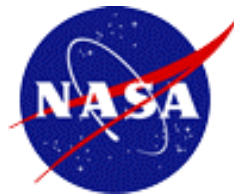


SECTION D
FISH OF PLUM BROOK STATION



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Section D
Fish



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Introduction

The principle objective of this study was to document the fish species and community compositions present within the various aquatic habitats found on NASA Plum Brook Station, Erie and Huron counties. Secondary objectives were to ascertain the presence of any federal or state listed species, which might warrant specific management considerations.

Plum Brook Station is drained by several small, often intermittent Lake Plain streams that are direct tributaries to Lake Erie. Plum Brook and Ransom/Taylor Ditch are the two primary systems draining the area. The headwaters of both of these small streams originate wholly within the facility's boundaries. Pipe Creek traverses the western corner, and is the primary drainage system for most of the station grounds west of Ransom Road. In addition to these three drainages, the headwaters of several other drainage ditches to the north and east of the research station originate within the facility's boundaries. Plum Brook Station also has a variety of ponds and reservoirs that are used as settling ponds, water storage for use in test facilities, or left over from previous settlements.

Few states have been investigated as thoroughly as Ohio with respect to its fish fauna. Fisheries investigations in Ohio date as far back as 1838 with Kirtland's surveys in northeast Ohio and the Mahoning River system (Kirtland 1838). Dr. Kirtland reported on 72 species of fish from Ohio. Jordan (1882) and Osburn (1901) were the next biologists to systematically survey Ohio's fishes statewide. Jordan's list included about 100 species, while Osburn recorded about 135 species. Starting in 1925, M.B. Trautman picked up where Osburn and others left off and initiated a systematic statewide inventory of the fish inhabiting Ohio's waters. These surveys continued over the next 30 years culminating in Trautman's landmark publication, *The Fishes of Ohio*, (1957). Trautman's surveys documented 172 species of fish. It is this data base and the author's own investigations throughout Ohio that provide the baseline for the evaluation of the fish communities at the Plum Brook Station.

Materials and Methods

Sampling of fish was conducted between the months of June through August in 1993, and July through October in 2001, using a combination of electroshocking and seining. Electrofishing gear included a 1750 watt T & J generator wired to a catch net and worked from a 10 foot johnboat. This method was used to sample as many of the small ponds and water storage basins as could be accessed by the investigators. The small size and intermittent nature of the streams on the property, coupled with the lack of woody debris or other obstructions in the channels made electrofishing either unfeasible or unnecessary. The only areas deep enough to allow for electroshocking were the small pools backed up by low concrete retention dams on Plum Brook and Ransom/Taylor Ditch. Most of the stream sampling was accomplished with the use of seines, including a six foot by ten foot seine with 3/16 inch mesh and a six foot by eight foot seine with 1/8 inch mesh, both with double weights on the lead line.

Fish collected during this survey were identified to species, counted, and released. Fish captured by electrofishing were placed in a large live-well until sampling was completed for the site. Fish captured by seining were identified, counted, and released each time the seine was lifted from the water. The small, intermittent nature of the streams generally allowed for entire pools to be sampled before the seine was lifted. Because the fish captured during this study were common species and there was a low level of species diversity at the Plum Brook Station, no voucher specimens were kept.

Rare and Endangered Species

No Federal or State listed species of fish were identified during the 1993 or the 2001 survey.

Results and Discussion

In 1994, a total of 19 collections were made at 19 sites (10 stream sites and 9 pond sites). Fourteen collections at 14 sites (7 stream and 7 pond habitats) were made in 2001. There were fewer sites done in 2001 because many of the areas were dry, or had so little water that fish were not present. These sites are identified by habitat type in Figure 1 and Table 1. During the survey in 1993, 3,028 individuals, representing 13 species and one hybrid were collected, compared to 2,156 individuals, representing 15 species and one hybrid collected in 2001 (Table 2). An annotated list of the species captured at Plum Brook Station can be found at the end of this section. Nine species of fish were collected from the stream sites in 1993, and 10 species were collected from the stream sites in 2001. Six species of fish and one hybrid were collected from pond and reservoir sites in 1993, compared to 8 species and one hybrid that were collected from the ponds and reservoir sites in 2001 (Table 3). At Plum Brook Station, the overall species diversity was not very different between the two habitat types. Small ponds and reservoirs, like the ones found at Plum Brook Station, generally support a much lower diversity than would be found in a healthy small stream. The small, intermittent nature of the streams in the study area coupled with extensive channel modifications and habitat degradations have resulted in a lower species diversity than would be found in more pristine headwater streams of similar size.

Survey results for specific streams are presented in Table 4. Pipe Creek had the highest diversity with seven species collected in 1993 and eight species collected in 2001. Plum Brook contained five species in 1993 and seven species in 2001, with the addition of the white sucker, bluntnose minnow, and the pumpkinseed sunfish and the loss of the green sunfish. Four species were collected from Taylor Ditch in 1993, and three species were collected from Taylor Ditch in 2001.

The relatively short section of Pipe Creek found within the boundaries of the study area appeared to be less impacted from channel modifications than Plum Brook and Taylor Ditch, and had a more natural riffle/pool development. Substrates were a mixture of sand, gravel, and fractured shales. The presence of a wooded riparian corridor on this section of Pipe Creek also improved habitat conditions and help reduce siltation. This stream was reduced to shallow, intermittent pools by early summer in both 1993 and 2001.

Table 1. Locations of collecting stations at the NASA Plum Brook Station.

Stream Habitats		
Station	Locality	Year
1	Plum Brook trib. upstream of junction with Plum Brook, north side of Penolite Rd. at bridge crossing, Perkins Twp., Erie Co.	1994
2	Plum Brook at concrete retention dam upstream of bridge on Penolite Rd. Perkins Twp., Erie Co.	1994 2001
3	Plum Brook downstream from culvert on Taylor Road. Perkins Twp., Erie Co.	1994 2001
4	Plum Brook downstream from culvert on Fox Road. Perkins Twp., Erie Co.	1994
5	Plum Brook downstream from culvert on North Magazine Road. Perkins Twp., Erie Co.	1994 2001
6	Taylor Ditch downstream of concrete retention dam at north end of the western-most reactor facility road north of Penolite Rd. Perkins Twp., Erie Co.	1994 2001
7	Taylor Ditch upstream of concrete retention dam at north end of the western most reactor facility road north of Penolite Rd. Perkins Twp., Erie Co.	1994
8	Pipe Creek upstream of bridge on Patrol Rd., west of Campbell Rd. Perkins Twp., Erie Co.	1994 2001
9	Pipe Creek at culvert on Patrol Rd. on west edge of Plum Brook Station. Perkins Twp., Erie Co.	1994 2001
10	Tributary to Pipe Creek at culvert on south side of Maintenance Rd. west of Control Rd. at K Site Control Bldg. Perkins Twp., Erie Co.	1994 2001

Artificial Water Bodies		
Station	Locality	Year
11	Water reservoir # 8191 by Maintenance Center on Maintenance Rd. north of Taylor Rd. Perkins Twp., Erie Co.	1994 2001
12	Water reservoir at old recreation area adjacent to pumping station between Fox Rd. and Patrol Rd. west of Ransom Rd. Perkins Twp., Erie Co.	1994 2001
13	Large pond north of Fox Rd. west of Campbell Rd. on western side of Plum Brook Station. Perkins Twp., Erie Co.	1994 2001
14	Water Basin at B1 substation on south side of Box Factory Rd., Pond closest to road. Perkins Twp., Erie Co.	1994
15	B2 retention pond north of North Magazine Rd. approximately ¼ mile east of bridge over Plum Brook. Perkins Twp., Erie Co.	1994 2001
16	Pond on west side of Snake Road, approximately ½ mile south of North Magazine Rd. Perkins Twp., Erie Co.	1994 2001
17	Pond on north side of North Magazine Rd. at junction with Columbus Rd. Perkins Twp., Erie Co.	1994
18	Pond on south side of North Magazine Rd. at junction with Columbus Rd. Perkins Twp., Erie Co.	1994 2001
19	Pond on north side of Patrol Rd. east of Taft Rd. on southern edge of Plum Brook Station. Oxford Twp., Erie Co.	1994 2001

Table 2. Total species and numbers of fish captured at the NASA Plum Brook Station.

Species	Latin	# in 1994	# in 2001
White Sucker	<i>Catostomus commersoni</i>	66	72
Goldfish	<i>Carassus auratus</i>	4	1
Creek Chub	<i>Semotilus atromaculatus</i>	390	372
Striped Shiner	<i>Luxilus chrysocephalus</i>	4	39
Spotfin Shiner	<i>Cyprinella spiloptera</i>	x	1
Fathead Minnow	<i>Pimephales promelas</i>	559	500
Bluntnose Minnow	<i>Pimephales notatus</i>	13	170
Central Stoneroller	<i>Campostoma anomalum</i>	214	172
Black Bullhead	<i>Ameiurus melas</i>	17	49
Largemouth Bass	<i>Micropterus salmoides</i>	87	37
Green Sunfish	<i>Lepomis cyanellus</i>	865	312
Bluegill	<i>Lepomis macrochirus</i>	692	272
Pumpkinseed Sunfish	<i>Lepomis gibbosus</i>	9	28
Green Sunfish x Hybrid	<i>HYBRID</i>	107	122
Brook Stickleback	<i>Culaea inconstans</i>	1	7
Round Goby	<i>Neogobius melanostomus</i>	x	2
Total Individuals		3,028	2,156

Table 3. Fish communities of the NASA Plum Brook Station.

Species	Streams		Ponds	
	1994	2001	1994	2001
White Sucker	66	72	x	x
Goldfish	x	x	4	1
Creek Chub	390	372	x	x
Striped Shiner	4	39	x	x
Spotfin Shiner	x	1	x	x
Fathead Minnow	559	124	x	376
Bluntnose Minnow	13	170	x	x
Central Stoneroller	214	172	x	x
Black Bullhead	x	x	17	49
Largemouth Bass	x	x	87	37
Green Sunfish	599	7	266	305
Bluegill	2	x	690	272
Pumpkinseed Sunfish	x	2	9	26
Green Sunfish x Hybrid	x	x	107	122
Brook Stickleback	1	7	x	x
Round Goby	x	x	x	2
Total Individuals	1,848	966	1180	1190
Total Species	9	10	6+HYB	8+HYB

Both Plum Brook and Taylor Ditch have been intensively modified for drainage within the study area. These two streams were characterized by steep banks (2 to 1 slope) that were vegetated with a mixture of grasses and herbaceous weeds, and shrubs (primarily dogwoods and willows). The stream channels were relatively straight due to dredging activities. Riffle/pool development was very poor and water depths were fairly uniform. Both streams became intermittent in the summer and fall with small, isolated pools associated with culverts, bridges, and small retention dams found in the lower sections of these streams. Many of these areas were dry in 2001, so fewer sites were sampled in this year. Stream substrates in Plum Brook and Taylor Ditch were a mixture of fine gravels with some silt. In the pools behind the retention dams, the bottom substrates were composed of a thick layer of silt and organic debris as much as two to three feet deep. On Taylor Ditch, the only pools found and subsequently sampled were those associated with one of these retention dams and an old road culvert immediately downstream from the dam. Plum Brook's fish community was dominated by fathead minnows, creek chubs, central stonerollers, and green sunfish in 1993. These species still dominated in 2001, except for the green sunfish. No green sunfish were captured in 2001. This could be due to the fact that Plum Brook was sampled later in the year in 2001, and the water levels were very low. During low water levels, the green sunfish could have migrated downstream into deeper water. Fewer sites were sampled for Plum Brook due to water levels in 2001. Taylor Ditch was dominated by fathead minnows, green sunfish, and creek chubs in both years. Fewer fish were captured in 2001 because water levels were low and only one site was sampled on Taylor Ditch.

With the exception of the brook stickleback, all the species captured in this study were common species statewide, exhibiting high degrees of tolerance to habitat and water quality degradations. Species requiring specialized habitats and excellent water quality were absent from these as would be expected given the past land use of the area. The brook stickleback represents the only habitat specialist found in the survey. Sticklebacks inhabit small springs, brooks, and other small water bodies characterized by clear, cool waters and beds of submersed aquatic vegetation. A small population of sticklebacks was discovered by Ralph Pfingsten in a small, shallow pool below a culvert in one of the tributary ditches feeding into Pipe Creek in 1993. This population was still there in 2001.

Sampling of the small ponds and reservoirs on Plum Brook Station resulted in the capture of 1,180 individuals representing six species of fish and one hybrid in 1993. In 2001, 1,190 individuals representing eight species and one hybrid were captured. Results were summarized in Table 5. Fish communities in these ponds seem to be the result of inadvertent or haphazard introductions. Two of the ponds sampled in 1993 (Site 13 and Site 19) contained no fish. Site 13 contained two species of fish (fathead minnows and green sunfish) when sampled in 2001. Site 19 was not sampled in 2001. Surprisingly, the pond on Snake Road, which offered excellent fish habitat (clear water, submersed aquatic vegetation, woody debris, and a mixture of substrates) was populated entirely by largemouth bass in 1993, and only contained green sunfish in 2001. Species diversity in the remaining ponds sampled ranged from two to four species (not counting hybrids) in both 1993 and 2001. Most of the ponds were dominated by bluegill and green sunfish and their hybrids. Water reservoir # 8191 was dominated by largemouth bass and bluegill with incidental occurrences of goldfish and green sunfish in 1993 and round goby in 2001. This reservoir, owing to its larger size, greater water depths, influx of

Table 4. Total species by stream system at the NASA Plum Brook Station

Species	Plum Brook		Taylor Ditch		Pipe Creek	
	<u>1994</u>	<u>2001</u>	<u>1994</u>	<u>2001</u>	<u>1994</u>	<u>2001</u>
White Sucker	x	14	x	x	66	58
Creek Chub	294	107	45	13	51	52
Striped Shiner	4	2	x	x	x	37
Spotfin Shiner	x	x	x	x	x	1
Fathead Minnow	262	94	293	29	4	1
Bluntnose Minnow	x	3	x	x	13	67
Central Stoneroller	211	89	x	x	3	83
Green Sunfish	241	x	354	7	4	x
Pumpkinseed Sunfish	x	2	x	x	x	x
Brook Stickleback	x	x	x	x	1	7
Total Individuals	1012	311	694	49	142	306
Total Species	5	7	3	3	7	8

Table 5. Total species captured in ponds and reservoirs at the NASA Plum Brook Station.

Species	Site 11		Site 12		Site 13		Site 14		Site 15		Site 16		Site 17		Site 18		Site 19	
	<u>1994</u>	<u>2001</u>	<u>1994</u>	<u>2001</u>	<u>1994</u>	<u>2001</u>	<u>1994</u>	<u>2001</u>	<u>1994</u>	<u>2001</u>	<u>1994</u>	<u>2001</u>	<u>1994</u>	<u>2001</u>	<u>1994</u>	<u>2001</u>	<u>1994</u>	<u>2001</u>
Goldfish	1	x	3	1	x	x	x	x	x	NA	x	x	x	x	x	x	x	NA
Fathead Minnow	x	x	x	x	x	376	x	x	x	NA	x	x	x	x	x	x	x	NA
Black Bullhead	x	x	x	x	x	x	x	x	x	NA	x	x	x	x	17	49	x	NA
Largemouth Bass	55	10	x	x	x	x	6	7	x	NA	17	x	9	9	x	11	x	NA
Green Sunfish	1	x	231	77	x	4	x	2	2	NA	x	115	6	1	29	106	x	NA
Bluegill	134	16	93	78	x	x	14	37	121	NA	x	x	328	141	x	x	x	NA
Pumpkinseed	x	x	x	x	x	x	x	x	x	NA	x	x	9	1	x	25	x	NA
Green SF Hybrid	1	x	103	47	x	x	x	x	1	NA	x	x	2	x	x	75	x	NN
Round Goby	x	1	x	1	x	x	x	x	x	NA	x	x	x	x	x	x	x	NA
Total Individuals	192	27	430	204	0	380	20	46	124	NA	17	115	351	152	46	266	0	NA
Total Species	4	3	3	4	0	2	2	3	2	NA	1	1	4	4	2	4	0	NA

fresh water, and physical habitat structure (root wads, woody debris, and rip-rap along the shoreline) had the best population of largemouth bass in 1993. In 2001, this pond seemed out of balance. Fewer fish overall were captured, the bass that were captured looked hungry and skinny, and very few bluegill larger than one inch were captured.

Recommendations

The small, intermittent nature of the streams in the study area, coupled with past channel modifications of Plum Brook and Taylor Ditch (both on and off the study site), severely limit the options available for improving the fish communities in these streams. Given enough time and the return of a wooded riparian corridor, such as exists on Pipe Creek, the instream habitats (pools, riffles, and runs, root wads and woody debris) might recover to the point where a more balanced and diverse fish community could exist. Establishment of such a community would be dependent on the source populations from outside the study area of fish that utilize small stream habitats, and their ability to recolonize the streams if the habitat conditions changed for the better over time. The intermittent nature of these streams will always limit the biodiversity to fish that are adapted to this type of habitat and flow regime.

In regards to the ponds on the property, no management should be done unless the goal is to improve/manage these ponds for recreational fishing. The species present are all common species and do not warrant special consideration with regards to the management of Plum Brook station.

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An Annotated List of the Fish of the NASA Plum Brook Station

White Sucker, *Catostomus commersoni*

This is one of the most common and widespread sucker species in Ohio. It occurs statewide, inhabiting a variety of streams, natural lakes, and other water bodies. While the larger adults are typically found in medium and larger streams, spawning occurs in smaller stream, and the young are commonly found in headwater tributaries. White suckers are more tolerant to increased water turbidity and siltation of habitats than other species of suckers found in Ohio. White suckers were found in two streams at Plum Brook Station. In 1993, white suckers were found only in Pipe Creek, which is the least modified stream of the three streams sampled. They were collected in Plum Brook at the site downstream of the concrete retention dam and in Pipe Creek in 2001. The water retention dams on Ransom Ditch and Plum Brook would block potential spawning runs of this species to the stream sections above the dams.

Goldfish, *Carassius auratus*

Like the common carp, goldfish were introduced into Ohio waters in the late 1800's by fish culturalists and owners of aquaria. Distributed statewide in a variety of aquatic habitats, goldfish reached their greatest abundance in the western basin of Lake Erie, where they were commercially harvested. Goldfish and carp frequently hybridize with each other. Goldfish were present in two of the water storage reservoirs at NASA Plum Brook Station in 1993. A single specimen was taken from Site 12 in 2001. As both of these reservoirs get their water pumped in from Lake Erie, it is likely that the goldfish came in from Lake Erie.

Creek Chub, *Semotilus atromaculatus*

This is one of the most common and widespread stream fish in Ohio. Moderately tolerant of turbid waters and other types of pollution, it is found in a wide range of streams, ponds, and lakes. It is most common in the smaller streams and brooks of the state, and is one of the characteristic species in these headwater systems. Fishermen often use them as bait. This was the third most abundant species in the stream communities at Plum Brook Station in 1993, and the most abundant stream species in 2001.

Striped Shiner, *Luxilus chrysocephalus*

This is one of the common and widespread species of shiners found in Ohio. It is statewide in distribution, inhabiting streams of all sizes. The largest populations of striped shiners are often found in the small streams in Ohio, particularly during the spring spawning season. The adults tend to drop downstream into the larger pools as summer progresses. At Plum Brook Station, four individuals were captured in the pool above the retention dam on Plum Brook. In 2001, over 30 individuals were collected from Pipe Creek, and two individuals were collected from Plum Brook.

Spotfin Shiner,

This common species of shiner is found throughout the state of Ohio in streams and rivers of all sizes, as well as in sloughs, ponds, and lakes. It prefers streams of base

or low gradients, and is very tolerant to siltation, turbidity, and other forms of pollution. In streams with siltation and turbid water, the spotfin may be the most numerous shiner present. Only one specimen was collected in Pipe Creek in 2001, and no specimens were collected at all in 1993. This individual is probably a stray from the downstream segments of Pipe Creek or Lake Erie.

Fathead Minnow, *Pimephales promelas*

This is one of the more tolerant species of fish found in Ohio. It can survive under conditions of pollution, increased water turbidity, and even low pH that are often not conducive to most other fish species. Fathead populations tend to flourish only in the absence of competition from the other species it often associates with, such as bluntnose minnows. This species is normally found in small streams, ponds, and lakes. It is frequently raised and sold as a bait minnow for fishermen, and many populations may be the result of "bait bucket" introductions. This was the second most abundant species in the streams at Plum Brook Station in 1993, comprising 30% of all individuals collected. In 2001, this species comprised 12% of the stream species captured, and was the fourth most abundant species captured. Although no fathead minnows were captured in the ponds in 1993, over 300 were captured at site 13, where no fish were previously recorded, making this the most abundant fish collected from ponds in 2001.

Bluntnose Minnow, *Pimephales notatus*

This is probably the most common fish in Ohio. Bluntnose minnows utilize a wide variety of habitats, and can tolerate a variety of conditions. They are found in every water body capable of supporting fish, and thrive in turbid, nutrient rich waters. They are equally at home in small streams and brooks as they are in the largest rivers and lakes. At Plum Brook Station, this species was recorded only from Pipe Creek in 1993, where it was the third most common member of the stream's fish community. In 2001, a larger population was found in Pipe Creek, where it was the most abundant member of the stream's fish community. A small population of three individuals was also found in Plum Brook in 2001.

Central Stoneroller, *Compostoma anomalum*

This species is common and abundant in streams throughout much of Ohio. It is found primarily in the riffles and runs of smaller to medium-sized streams, but can also occur in larger rivers. Stonerollers are bottom feeders, utilizing a variety of plant and animal matter. While this was the fourth most abundant stream fish at Plum Brook Station in 1993, all but three individuals were captured in Plum Brook. The species was not recorded in Taylor ditch, and was incidental in Pipe Creek (3 individuals) in 1993. In 2001, the stoneroller was the third most abundant species in Plum Brook and the most abundant species in Pipe Creek, accounting for approximately 30% of individuals in each of these streams. As in 1993, this species was not collected from Taylor Ditch in 2001.

Black Bullhead, *Ameiurus melas*

This species is found statewide, in small numbers, inhabiting oxbows, overflow ponds, lakes, and the base-gradient sections of small to medium-sized streams. Black bullheads show a preference for turbid waters with muddy bottoms, and will tolerate high

levels of pollutants and high water temperatures. The largest populations were found in the shallow waters of Sandusky Bay and other areas in western Lake Erie. At Plum Brook Station, this species was found in a small, shallow, turbid pond ringed with cattails located on the south side of North Magazine Rd. at Columbus Rd. in 1993 and in 2001.

Largemouth Bass, *Micropterus salmoides*

An inhabitant of lakes, estuaries, and slack water pools of the larger streams throughout Ohio, this species has probably been stocked into every suitable body of water in the state. The largest populations were originally found in habitats characterized by clear water, silt-free substrates, and beds of submersed aquatic vegetation. This species was found in four of the nine “ponds” sampled at Plum Brook Station in 1993 and was found in four ponds in 2001, although not the same four ponds. The largest population was found in the raw water storage reservoir north of Taylor Rd. at Maintenance Rd.

Green Sunfish, *Lepomis cyanellus*

This is a common fish found throughout Ohio. It is tolerant to a variety of habitat conditions, and thrives in degraded habitats not suitable for other members of its genus. The green sunfish is found in streams, lakes, ponds, and wetlands of all sizes. It often hybridizes with other species of sunfish. This was the most abundant fish species recorded at Plum Brook Station in 1993, accounting for 29% of all individuals captured. In 2001, this species was the third most abundant fish captured. It was the most common species in the streams, and ranked second only to the bluegill in the ponds within the study area in 1993. This fish only accounted for 1% of the individuals in the streams sampled, although it was the second most common fish in the ponds in 2001.

Pumpkinseed Sunfish, *Lepomis gibbosus*

Pumpkinseed sunfish are one of the characteristic species of glacial lakes of northern Ohio and other wetlands with clear water, silt-free substrates, and submersed aquatic vegetation. The majority of the populations are found in northern Ohio, but extensive stocking efforts succeeded in establishing populations in other areas of the state. At Plum Brook Station, a small population of this species was identified in the pond on the north side of North Magazine Rd. at its junction with Columbus Rd in 1993. Two populations of pumpkinseeds were found in 2001. The pond on the north side of Magazine Rd. still contained its population, and two individuals were collected from Plum Brook.

Round Goby, *Neogobius melanostomus*

The Round Goby is an invasive species introduced to the Great Lakes through ballast water from ships, and is now starting to spread inland through canals and tributaries to the Lakes. This fish is a small benthic fish that resembles native sculpins, and because it is larger than most benthic fish, aggressive, tolerant to a variety of conditions and habitats, and can breed up to six times a year, it often out-competes other benthic fish such as native darters and sculpins. It is native to the Black Sea and Caspian Sea in Eastern Europe. This fish was not found at the Plum Brook Station in 1993, but was collected at Site 11 and 12 in 2001. Since both of these reservoirs pump water from Lake Erie, these fish probably migrated into the reservoirs from there.

Brook Stickleback, *Culaea inconstans*

This northern species of cold, clear waters reaches the southern edge of its range in Ohio, where it is primarily found in smaller streams with clear water and beds of submersed aquatic vegetation. Populations in Ohio are extremely local in nature, with the primary center of distribution occurring in northeast Ohio and the Mad River drainage in west central Ohio. Ditching, dredging, and filling easily destroy the small headwater habitats of this species. Many populations have been extirpated. At Plum Brook Station, a small population of sticklebacks was found in a small, shallow pool below a culvert in one of the tributary ditches feeding into Pipe Creek in both 1993 and in 1999.